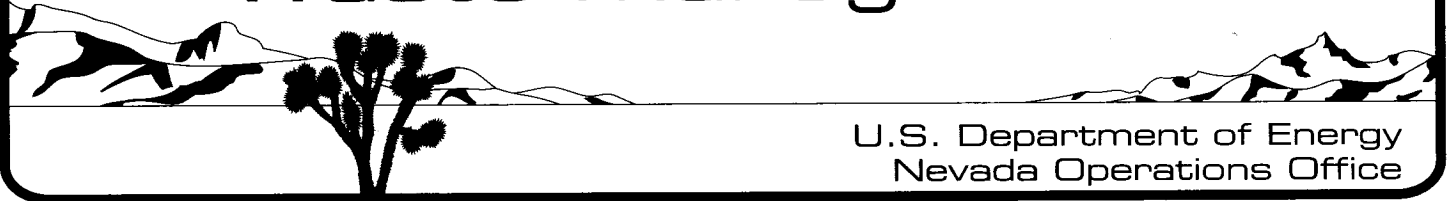


# Waste Management



U.S. Department of Energy  
Nevada Operations Office

## Managing Mixed Waste at the Nevada Test Site

The U.S. Department of Energy, Nevada Operations Office (DOE/NV) manages mixed waste which, by definition, contains radioactive and hazardous components. Mixed waste is generated primarily by the DOE as a result of defense industry activities. Activities involving the proper acceptance, treatment, storage, and/or disposal of waste are conducted in accordance with applicable federal, state, and local regulations.

- Hazardous waste, as identified by the U.S. Environmental Protection Agency (EPA), refers to waste that is harmful to human health or that may damage the environment. This waste is nonradioactive and has one or more of the following characteristics: ignitable, corrosive, reactive, toxic, or is listed by the EPA as being a hazardous waste. Types of hazardous waste include substances such as ethyl alcohol, Freon, and various metals.
- Radioactive waste contains radioactive isotopes that emit alpha particles, beta particles, or gamma rays. Alpha radiation can be stopped by a sheet of paper and will not penetrate the skin, but it is harmful if ingested or inhaled. Beta radiation can pass through an inch of water or skin but not through a thin sheet of aluminum, plywood, or steel. Gamma rays are the most penetrating radiation and can pass through many materials including the human body, but they cannot pass through dense materials like lead.



**Hazardous waste stored  
at the NTS.**

Mixed waste requires management from its identification through its disposal, commonly referred to as the "cradle-to-grave" system. This procedure is mandated in the Resource Conservation and Recovery Act (RCRA), which defines requirements for the management of hazardous waste. The radioactive component of mixed waste may be subject to management in accordance with the Atomic Energy Act.

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## Types of Mixed Waste

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Mixed waste typically falls into one of two categories, low-level waste or transuranic waste.

**Mixed low-level waste** contains a hazardous element and radionuclides. Generally, this material may be handled directly without the use of protective shielding. A wide range of processes and activities generate mixed low-level waste including equipment maintenance, material production, environmental restoration work, and facility decontamination and decommissioning.

**Mixed transuranic waste** contains hazardous and transuranic components. Transuranic waste contains man-made elements heavier than uranium, hence the name “trans” or “beyond” uranium. Transuranic waste is not handled directly and requires the use of protective shielding.

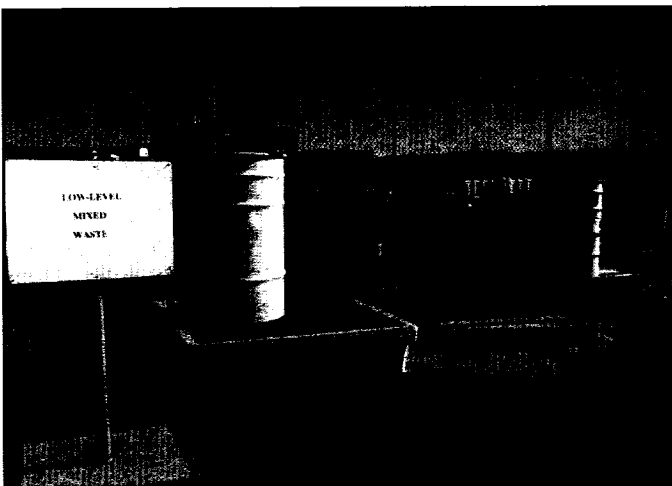
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## Mixed Waste Treatment, Storage, and Disposal

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Mixed waste is stored and/or disposed of at the Nevada Test Site (NTS). The management of mixed waste is regulated jointly by DOE (because of the radioactive component) and the State of Nevada (because of the hazardous component). There are three agreements dealing with the management of mixed waste at the NTS, which are as follows:

- The *Settlement Agreement* for the storage of mixed transuranic waste
- The *Mutual Consent Agreement* for the storage and management of newly generated mixed low-level waste
- The *Federal Facility Compliance Act Consent Order (FFCAActCO)*, which required DOE to develop a comprehensive plan to treat historic mixed waste



**Mixed low-level waste  
stored at the NTS.**

The DOE/NV handles mixed waste at the NTS in accordance with these agreements to protect human health and the environment. Management of mixed waste includes: researching treatment options; selecting preferred and alternative treatment methods; verifying that the waste meets applicable waste acceptance criteria, which is required by treatment and disposal sites; shipping the waste to the selected site; and tracking the waste through its final disposition.

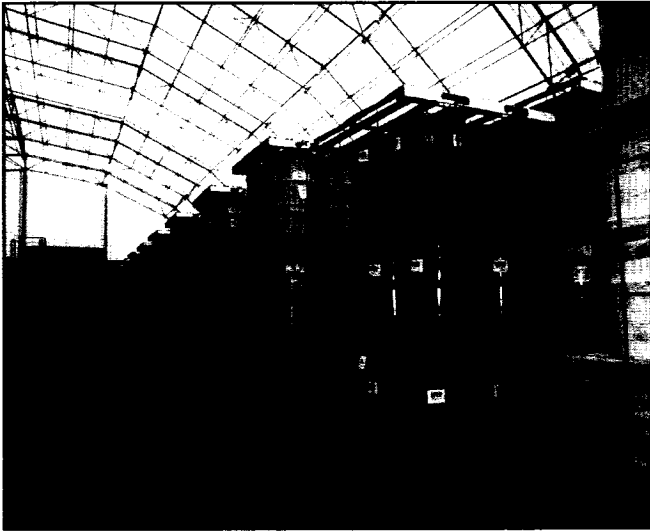
Mixed low-level waste is stored at the NTS in steel boxes and drums on an asphalt pad. This storage pad is located at the Area 5 Radioactive Waste Management Site (RWMS).



This mixed waste includes:

- Polychlorinated biphenyl soil
- Bulk lead waste
- Decontamination pond soil
- Lead-contaminated soil
- Solvent sludge
- Building 650 leachfield soil

Mixed transuranic waste is also contained in steel boxes or drums and is temporarily stored at the NTS. The mixed transuranic waste is located inside a steel-framed, fabric-covered structure which is situated on a 2.1-acre (8,300-square meter) asphalt pad. The pad creates a waterproof layer that prevents moisture from seeping into the soil. An 8-inch (20-centimeter) curb surrounds the pad to prevent run-on and runoff. Waste management specialists regularly inspect the waste containers to make certain they have not been degraded or damaged. In addition, the labels and markings on each container are examined to ensure they remain legible.



**Mixed transuranic waste stored at the NTS.**

Because materials contaminated with transuranic radionuclides can take thousands of years to decay, transuranic and mixed transuranic wastes require long-term isolation. It is planned that this waste will be shipped from the NTS to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico; however, compliance with the WIPP waste acceptance criteria must be met before waste disposal can occur.

The transuranic waste stored at the NTS was packaged before EPA determined the RCRA characterization requirements. Therefore, knowledge regarding the hazardous waste components present in the stored material was gained through information provided by employees familiar with the process that generated the waste.

The waste components must be identified with more certainty to meet the WIPP waste acceptance criteria. This identification will occur through a waste characterization process which will analyze waste packages and verify that the waste meets the acceptance criteria for disposal at WIPP.

## **Another Type of Mixed Waste Managed at the NTS**

A unique, mixed low-level waste that was successfully managed by the DOE/NV under the FFCActCO was a uranium-rich material known "Cotter Concentrate." Originally designated as a potential resource by DOE, Cotter Concentrate was shipped to the NTS in 1987 from the DOE Mound Facility in Ohio. The material was to eventually undergo additional uranium extraction for use in the nuclear weapons program. However, due to the decline in demand for raw materials for





***Cotter Concentrate  
being over-packed for  
shipment to a uranium  
processing facility.***

the production of nuclear weapons, DOE determined there was no longer a use for Cotter Concentrate and declared the material mixed waste.

Although conventional methods for treatment and disposal of the material were initially pursued, they proved to be costly and slow to develop. In 1997, after an alternative proposal was found to be technically feasible, Cotter Concentrate was redesignated as a feedstock material for nuclear power plant reactors. The material was shipped to a uranium processing facility in southeast Utah where additional uranium extraction was performed on the material. This alternate method of reprocessing allowed for the implementation of RCRA in its intended manner (i.e., recovery).

Cotter Concentrate constituted approximately 88% of the mixed waste in temporary storage at the NTS. The recycling of Cotter Concentrate netted the DOE cost-savings of approximately three million dollars because DOE did not have to perform treatment and disposal activities on the material. In addition, the material was recovered and will be used in the production of energy by commercial nuclear power plants rather than being discarded as waste. The benefit to the uranium processing facility was obtaining high-grade uranium feedstock material at minimal cost as well as gaining the potential profit on the sale of the extracted uranium product.

## Summary

Mixed waste will continue to be managed at the NTS to support remediation and other activities. RCRA defines requirements for the hazardous components of mixed waste. Regulatory authority is stated in the Settlement Agreement, the Mutual Consent Agreement, and the FFCActCO. Depending upon the generation and/or type of mixed waste, it is treated, stored, and/or disposed of on or off site. When possible, recycling and other pollution prevention and waste minimization methods are implemented for efficiency and environmental considerations.

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